La gent gran i les TIC
Barcelona, 22 d’Abril 2013

Les TIC per a la salut integral i la vida activa i independent
• Active Independent Living at BDigital
• Ageing society, facts
• Ambient Assisted Living
• Available products: teleassistance, telemedicine
• Our approach: SAAPHO project
• Conclusions: lessons learned
eHealth and eInclusion R&D

- Personalized Computational Medicine
- Integrated Continuous Care
- Active Independent Living
eHealth and eInclusion R&D

Active Independent Living

- Ambient Intelligence & Context Awareness
- Assistive Technologies
- Web 2.0 and Intelligent Collaborative Environments
- Sensors & Robotics
- Ubiquitous Accessibility
- Intelligent Content Management
- Multimodal Personalized User Interfaces
- Open Interoperable and Secure Middleware

THERAPISTS

CARERS
Secure Active Aging: Participation and Health for the Old People

- Instrument: AAL Call 3
- Duration: 2011-2014
- BDIGITAL role:
  - Project coordinator
  - Leader of Participation and Security Technologies WPs
Autonomy and Social Inclusion through mixed reality brain-computer interfaces: connecting the disabled to their physical and social world

- Instrument: FP7  ICT Strep
- Duration: 2010-2012
- BDIGITAL role:
  - Project coordinator
  - Leader of Ambient Intelligence and Social Network WP
Active Independent Living - Projects

Brain-neural computer interfaces on track to home – Development of a practical generation of BNCI for independent home use

- Instrument: FP7 ICT Strep
- Duration: 2012-2015
- BDIGITAL role:
  - Project coordinator
  - Leader of telemonitoring and home support through ambient intelligence, cognitive rehabilitation, and automatic quality of life assessment
Active Independent Living - Projects

Cloud platforms Lead to Open and Universal access for people with Disabilities and for All

- Instrument: FP/ - Cooperation
- Duration: 2011-2015
- BDIGITAL role:
  - automatic modification of user profile based on changing contexts
  - auto-personalisation of mobiles depending on the user profile and the accessibility features of these devices
  - auto-personalisation social networking interfaces depending on user profile preferences
Ageing Society, facts

• Demographic change and ageing in Europe implies not only challenges but also opportunities for the citizens, the social and healthcare systems as well as industry and the European market.

• Europe, like many other developed parts of the world, is in the middle of a demographic transition which is fundamentally transforming the ways in which our societies are structured and function. Very large numbers of the post-1945 baby boom generation are changing their lives from full-time workers to full-time pensioners, sometimes adopting part-time or flexible work as a transition step.
Figure 1.1: Relative importance of elderly persons in the total population on 1 January (% share of total population)

Source: Eurostat (online data code: demo_pjanind)
Figure 1.10: Projected structure of the population by age group, EU-27, 1 January (')
(% share of total population)

- Aged 80+
- Aged 65-80
- Aged 50-64

() 2010, estimates.

Source: Eurostat (online data code: proj_10c2150p)
Foster the emergence of innovative ICT-based products, services and systems for ageing well at home, in the community, and at work, thus increasing the quality of life, autonomy, participation in social life, skills and employability of elderly people, and reducing the costs of health and social care.

EU has invested in the last 5 years more than 300M€ in public funds to foster a global investment of about 700M€.
Ambient Assisted Living

Surrounding

- Mobility
- Social Interaction
- Working Life

Person@Home

- Health & Wellness
- Hobbies
- Information & Learning
- Home Care
- Supply with Goods & Chores
- Safety, Security & Privacy

Well being Person
## Ambient Assisted Living

### Table 6.10: Internet use and activities carried out by individuals, by age group, EU-27

<table>
<thead>
<tr>
<th></th>
<th>Total population</th>
<th>Aged 55-64</th>
<th>Aged 65-74</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of use: at least once a week</td>
<td>43</td>
<td>65</td>
<td>26</td>
</tr>
<tr>
<td>Frequency of use: daily</td>
<td>29</td>
<td>53</td>
<td>17</td>
</tr>
<tr>
<td>Used Internet in the last 3 months:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>for any training and education related purposes</td>
<td>:</td>
<td>39</td>
<td>:</td>
</tr>
<tr>
<td>for looking for information about education, training or course offers</td>
<td>:</td>
<td>23</td>
<td>:</td>
</tr>
<tr>
<td>to do an online course (of any subject)</td>
<td>:</td>
<td>4</td>
<td>:</td>
</tr>
<tr>
<td>reading/download online newspapers/news</td>
<td>17</td>
<td>34</td>
<td>10</td>
</tr>
<tr>
<td>to subscribe to news services or products to receive them regularly</td>
<td>:</td>
<td>6</td>
<td>:</td>
</tr>
<tr>
<td>seeking health information</td>
<td>16</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>sending/receiving e-mails</td>
<td>42</td>
<td>61</td>
<td>26</td>
</tr>
<tr>
<td>playing/downloading games, images, films or music</td>
<td>16</td>
<td>28</td>
<td>4</td>
</tr>
<tr>
<td>finding information about goods and services</td>
<td>39</td>
<td>56</td>
<td>24</td>
</tr>
<tr>
<td>job search or sending an application</td>
<td>10</td>
<td>15</td>
<td>2</td>
</tr>
<tr>
<td>downloading software</td>
<td>13</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>telephoning or video calls</td>
<td>:</td>
<td>19</td>
<td>:</td>
</tr>
<tr>
<td>listening to web radios and/or watching web TV</td>
<td>10</td>
<td>26</td>
<td>3</td>
</tr>
<tr>
<td>uploading self-created content to any website to be shared</td>
<td>:</td>
<td>22</td>
<td>:</td>
</tr>
<tr>
<td>posting messages to social media sites or instant messaging</td>
<td>:</td>
<td>32</td>
<td>:</td>
</tr>
</tbody>
</table>

Source: Eurostat (online data code: isoc_bde15cua)
Figure 6.26: Individuals using mobile devices for Internet access during the three months prior to the survey, EU-27, 2010
(% share of given age group)

(‘) Mobile phones (or smart phones), handheld computers (palmtop, PDA), portable computers (laptop) away from home or work.
Source: Eurostat (online data codes: isoc_bde15b_i and isoc_ci_ifp_lu)
Available products: teleassistance, telemedicine

Care Innovations (Intel & GE)

Cruz Roja + Vodafone

Qualcomm

Grupo NEAT
SAAPHO
Secure Active Aging: Participation and Health for the Old
Modern European societies are committed to take care of their citizens, but the ageing trend will burden healthcare system and to guarantee the feasibility of this commitment innovative approaches are required.

These changes in demographics will have a clear effect on the society in which we live and pose a major challenge to the sustainability of healthcare and pensioning systems.

Ageing puts a strain on the well-being, independence and dignity of people’s life and the innovative approaches need to be meaningful and of value not only to the system but also to the individuals.
The Ageing problem: Active Ageing

According to the recommendations made by WHO in the policy framework Active Ageing, this term entails the optimization process of the health, participation and security opportunities in order to improve the life quality of people as they get older, including the disabled fragile people who need attendance (WHO, 2002).

The attendance of seniors might be eased by the use of novel ICTs initiatives which are called to play a key role in the following years.
The SAAPHO project

The SAAPHO project (AAL-2010-3-35) supports Active Ageing by assisting seniors to participate in the self-serve society preserving and enhancing independence and dignity through the application of innovative ICT-based solutions.

- To boost accessibility to a diverse number of services by means of easy-to-use and easy-to-configure user interfaces.

- To offer intelligent, intuitive and user-friendly tools using tactile screens and mobile devices which represent a more intuitive form of human computer interaction for seniors.
The SAAPHO project

- **Social participation**: empower social inclusion by means of easy to use communication and participation services especially adapted to seniors

- **Security and safety**: ensure well-being of seniors using ambient sensors and monitoring ambient parameters in a smart and proactive way

- **Healthcare**: support seniors to follow their medical routines and monitor their health condition regularly by means of an expert system which also recommends good habits and best practices.
The **SAAPHO** project

**SAAPHO Middleware**
(Accessible, adaptable, context-awareness, interoperable, ubiquitous, scalable)

Health Services
- Medication monitor
- Blood pressure
- Activity
- Pulse
- Glucose

Security Services
- Gas
- Motion
- Smoke
- Temperature
- CO
- Falls
- Location

Participation Services
- Contacts
- Email, photo
- Interests
The SAAPHO project
The SAAPHO project

- **Main characteristics:**
  - Service Oriented Architecture (Web Services)
  - SOAP: control of the state, not restricted to HTTP, strong contracts
  - HTTPS
  - Concrete architecture of UNIVERSAAL Reference Architecture.

- **Strengths:**
  - Integration of different sensors and different services
  - Scalable
  - Open to include other components
  - Modular
  - Simple to integrate other services
  - Interoperable
  - Built-in accessibility
The **SAAPHO** project

- **User Interface (Year 1 Prototype)**
  - "**Personas**" method: target users represented in terms close to their needs
### The SAAPHO project

Examples of services: Participation services

<table>
<thead>
<tr>
<th>Users Preferences</th>
<th>Operations</th>
</tr>
</thead>
</table>
| Skype / MSN messenger             | • List of available users  
• Status of each user  
• Chat (open, initiate, close connection) with other users  
• Teleconference with other users.  
• Voice calls (open, initiate, close connection) to other users |
| Facebook / Picasa                 | • View and comment photos from other users of the system.  
• Upload, delete photos to the system and organize in albums.  
• Control the level of privacy.  
• Share albums to other users or make them publics. |
| Free SMTP (Gmail / Hotmail)       | • Send mail  
• Check and receive unread mails  
• Retrieve contacts list  
• Search mails by contact or by search term |
| Facebook                          | • Add, delete, and read comments  
• Fetch, post, delete a text to the wall  
• Retrieve user’s friends and maintain friend lists  
• Retrieve group details and members  
• Retrieve, edit, delete user's interests and likes  
• Retrieve, edit, delete user profile data and profile images |
| Radio, newspaper, games           | • open, close connection  
• Save as a “Favorites”  
• updates by RSS feeds |

Online APIs

Apps or websites
**SAAPHO : user-centred design**

- **Target profiles:**

  **Healthy older adults**
  - Functional level: *independents* for the daily activities.
  - Health perspective: *no chronic* diseases, no frailty, no risk factors for developing a new disease

  **Older adults with frailty or at risk**
  - Functional level: independents for the basic Daily Live Activities, may be *dependent* for some instrumental activities (cooking, shopping...).
  - Health perspective: people at risk for developing a *chronic* disease due to health risk factors such as diabetes mellitus, hypertension...
  - Psycho-social perspective and environment: persons with social conditions that are at risk of social *isolation*: living alone, widowhood, depression, low number of social contacts, environment with barriers.
SAAPHO : user-centred design

SAAPHO uses a **User-Centred Design Process**

- Questionnaires and Focus Groups have been run in Spain and Slovenia
- Topics related to users interaction, interface adaptations, health monitoring, home security and social participation have been widely discussed with users

Interviewed people considered **SAAPHO a good opportunity to facilitate their daily life**

Users felt **confident towards a system adapted to their needs and preferences**.
SAAPHO: Sensors and Tools selected by the users

- **Healthcare:**
  - Physical Activity Monitoring
  - Glucose Monitoring
  - Pressure Measurement
  - Medication Compliance Monitoring

- **Home Safety and Security:**
  - Temperature Monitoring
  - Smoke Detector
  - CO Detector
  - GAS Detector
  - Fall Detection in Indoor Environments
  - Fall Detection and Localization in Outdoor Environments

- **Participation Services:**
  - Video-voice Communication: Skype, Msn Messenger
  - Text Communication: e-mail, Facebook
  - Photo Sharing: Facebook, Picasa
  - Leisure: Radio, Newspapers
First Year Prototype Testing. Results

Demographics and ICT questions

- **10 older adults** (Spain, $n=5$; Slovenia, $n=5$) participated into testing sessions.

- **Age**, median (range): Spain: 69 (64-85); Slovenia: 63 (58-75).

- **Gender**: Spain: 60% women; Slovenia: 60% women.

- **Experience in ICT**:  
  - **None**: 0% Spain; 8% Slovenia.  
  - **Computer**: 100% Spain; 100% Slovenia.  
  - **Smartphone**: 0% Spain; 0% Slovenia.  
  - **Tablet PC**: 0% Spain; 0% Slovenia.
Y1P of the SAAPHO platform: Spain (n=5). Results

Figure 1. Feelings using the SAAPHO platform

Figure 2. Grade of perceived quality using SAAPHO

Recommendations to others and preferences
All participants would recommend the SAAPHO platform to another older person since they considered it very easy and useful for older people.
Y1P of the SAAPHO platform: Slovenia (n=5). Results

**Figure 1. Feelings using the SAAPHO platform**

- Very comfortable
- Comfortable
- Normal
- Stressed
- Very stressed

**Figure 2. Grade of perceived quality using SAAPHO**

Subject 1: 8
Subject 2: 9
Subject 3: 7
Subject 4: 8
Subject 5: 7

0=low quality 10=excellent quality

**Recommendations to others and preferences**

All participants would recommend the SAAPHO platform to another older person since they considered it was easy, useful and friendly for older people familiar with technology or interested in using it.
SAAPHO: user-centred design

- SAAPHO project was very well accepted and seen as an interesting and useful opportunity for participation by older people.

- The SAAPHO platform was easy to use according to usability test parameters of effectiveness, efficiency and satisfaction.

- Feedback provided by users was essential to ensure users satisfaction with the product under development.

- The involvement of older people was very helpful for the technologists to make decisions about SAAPHO design.

- The participation of older people will continue in the next prototypes. Testing sessions will be conducted in the two testing sites.
Business Model

Ecosystem Actors
- Users and informal carers
- Patients associations, Professional Associations
- Home care services, day care centres, nursing homes, telehealth services, pharmas, Prevention, Fitness/Wellness
- Telecom players, SW companies, OEM manufacturers, wireless chips producers, smartphone producers, ICT Management and ICT consultancies, Medical products
- National Health Services, Private health Insurances

Business Models in the market

Business models very variable across the market. Vendors are adapting their models in accordance with clients needs and local framework. Examples:

- One-off device purchase
- Leasing
- Renting
- Sponsors
- Subscriptions

Price model based on:
- Equipment and peripherals
- Services like installation, training, customization, etc
- Hosting of data
- Conditions monitored
- (...)

Marketplace
Conclusions: lessons learned

Active Ageing:

- stimulate and promote participation and e-Inclusion of elderly people.
- provide services related to health-care, participation and security

User centered design:

- User must take active participation in the design of technology
- It a good opportunity to make their daily life easier
- Users feel confident towards a system adapted to their needs and preferences

Personalization and adaption:

- Adaptive and user-customisable GUI
- Support to personalized actions and reminders to user
Mercès!

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